

Oceanic Influence on Global Hydrological Cycle

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Past studies of oceanic influence on terrestrial and cryospheric hydrological cycles were consisted largely of showing the relation between precipitation over landmasses and the surface temperature of surrounding oceans, based on numerical model simulation and analysis of model products. The long-term acceleration of the hydrologic cycle was demonstrated through its manifestation in the radiation budget. Direct physical linkage has been lacking because measurements of the hydrologic parameters, such as evaporation and moisture transport over the ocean, are extremely sparse. We will improve and consolidate on-going efforts in deriving hydrologic parameters over global oceans using newly-available and high-resolution space-based data, making use of our pioneering effort and unique expertise in space-based observations of surface evaporation and moisture transport. A multi-decadal time series of an integrated data set will be produced by synthesizing observations from a number of NASA missions. With this data set, we will improve the characterization and understanding of linkage between various water reservoirs over a wide spectrum of scales, and will reduce the uncertainties in terrestrial and cryospheric hydrologic balances. We will work with other investigators in examining land hydrologic parameters through a combination of active and passive microwave sensors, particularly the relation between precipitation and soil moisture. Greenhouse warming and long-term acceleration of hydrological cycle demonstrated through radiation data will be reconciled with associated changes in hydrologic parameters. With our unique data set and results, we will cooperated with, and contribute to, on-going efforts of modeling and prediction of hydrologic cycles. Our established data system and our long experience in public outreach, established through our long leadership in NASA flight projects, will help in the dissemination and display of the data and results to the science community and the public.